WHAT IS CLAIMED IS:

1. A method for detecting a pain-regulating substance comprising the steps of:
   (a) incubating a test substance with a cell or a preparation from a cell which has synthesized the protein PIM1-kinase or PIM3-kinase or a protein comprising SEQ ID NO: 2, 4, 6, 9 or 11 or a protein which is at least 90% homologous thereto or a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3, 5, 7, 8 or 10 or a protein encoded by a polynucleotide which is at least 90% homologous thereto, or a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3, 5, 7, 8 or 10 or antisense polynucleotides thereof, or a part protein of one of the abovementioned proteins which is at least 10 amino acids long and
   (b) measuring the binding of the test substance to the protein or part protein synthesized by the cell or measuring at least one functional parameter modified by the binding of the test substance to the protein or part protein.

2. A method according to claim 1, wherein the cell is manipulated by genetic engineering before step (a).

3. A method according to claim 2, wherein the manipulation by genetic engineering allows the measurement of at least one functional parameter modified by the binding of the test substance.

4. A method according to claim 3, wherein the manipulation by genetic engineering causes expression of a form of a G protein which is not expressed endogenously in the cell or introduction of a reporter gene.

5. A method according to claim 2, wherein the cell is manipulated by genetic engineering so that the cell contains at least one polynucleotide selected from the group consisting of SEQ ID NOS: 1, 3, 5, 7, 8 and 10 or a polynucleotide which is at least 90% homologous thereto.

6. A method according to claim 5, wherein the polynucleotide is contained in a recombinant DNA construct.

7. A method according to claim 2, wherein after the manipulation by genetic engineering and before step (a), the cell is cultured under conditions which allow expression.

8. A method according to claim 7, wherein the cell is cultured under selection pressure.

9. A method according to claim 1, wherein the cell is an amphibia cell, bacteria cell, yeast cell, insect cell or an immortalized or native mammalian cell.

10. A method according to claim 1, wherein the measuring of the binding is carried out via the displacement of a known labeled ligand of the part protein or protein or via the activity bound thereto from a labeled test substance.

11. A method according to claim 1, wherein the measuring of at least one functional parameter modified by the binding of the test substance is carried out via measurement of the regulation, inhibition or activation of receptors, ion channels or enzymes.

12. A method according to claim 1, wherein the measuring of at least one functional parameter modified by the binding of the test substance is

carried out via measurement of the modification of the gene expression, the ionic medium, the pH, the membrane potential, the enzyme activity or the concentration of the second messenger.

13. A method according to claim 1, wherein the protein or part protein in steps (a) and (b) is:

PIM1-kinase;

a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3 or 5 or a protein encoded by a polynucleotide which is at least 90% homologous thereto;

a protein with an amino acid sequence comprising SEQ ID NO: 2, 4 or 6 or a protein which is at least 90% homologous thereto;

a protein which is coded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3 or 5 or antisense polynucleotides thereof, or

a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

14. A method according to claim 13, wherein the protein or part protein in steps (a) and (b) is:

a protein encoded by a polynucleotide which is at least 95% homologous to a polynucleotide comprising SEQ ID NO: 1, 3 or 5;

a protein with an amino acid sequence which is at least 95% homologous to a protein comprising SEQ ID NO: 2, 4 or 6, or

a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

15. A method according to claim 14, wherein the protein or part protein in steps (a) and (b) is:

a protein encoded by a polynucleotide which is at least 97% homologous to a polynucleotide comprising SEQ ID NO: 1, 3 or 5;

a protein with an amino acid sequence which is at least 97% homologous to a protein comprising SEQ ID NO: 2, 4 or 6, or

a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

16. A polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO: 10.

17. A polynucleotide according to claim 16, which is at least 95% homologous with SEQ ID NO: 7 or SEQ ID NO: 10.

18. A polynucleotide according to claim 17, which is at least 97% homologous with SEQ ID NO: 7 or SEQ ID NO: 10.

19. An antisense polynucleotide or peptidic nucleic acid which is capable of binding specifically to a polynucleotide according to claim 16.

20. A vector comprising a polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO: 10 or a polynucleotide which is an antisense polynucleotide or peptidic nucleic acid which is capable of binding specifically to a polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO: 10.

21. A protein encoded by a polynucleotide according to claim 16.

22. A protein encoded by a polynucleotide which hybridizes under stringent conditions with SEQ ID NO: 7 or SEQ ID NO: 10 or an antisense polynucleotide thereof.

23. A protein which is at least 90% homologous with SEQ ID NO: 11.

24. The protein of claim 23, wherein said protein is at least 95% homologous with SEQ ID NO: 11.

25. The protein of claim 24, wherein said protein is at least 97% homologous with SEQ ID NO: 11.

26. An antibody against a protein wherein said protein is:

encoded by a polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or 10;

encoded by a polynucleotide which hybridizes under stringent conditions with SEQ ID NO: 7 or 10 or an antisense polynucleotide thereof or

at least 90% homologous with SEQ ID NO: 11.

27. A cell comprising:

a polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO:10;

an antisense polynucleotide or peptidic nucleic acid capable of binding specifically to a polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO: 10;

a protein encoded by a polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO: 10;

a protein encoded by a polynucleotide which hybridizes under stringent conditions with SEQ ID NO: 7 or SEQ ID NO: 10 or a protein encoded by an antisense polynucleotide thereof;

a protein which is at least 90% homologous with SEQ ID NO: 11, or

a vector comprising a polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO: 10 or an antisense polynucleotide or peptidic nucleic acid which is capable of binding specifically to a polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO: 10.

28. A transgenic non-human mammal, the germ and somatic cells of which comprise:

a nucleotide sequence which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO: 10, or

an antisense polynucleotide or peptidic nucleic acid capable of binding specifically to a polynucleotide which is at least 90% homologous with SEQ ID NO: 7 or SEQ ID NO: 10.

29. A transgenic non-human mammal according to claim 28, wherein said mammal is a rodent.

30. A transgenic non-human mammal, the germ and somatic cells of which no longer contain one of the nucleotide sequences according to claim 16 in an expressible form as a result of a chromosomal manipulation in the genome of said mammal or in the genome of an ancestor of said mammal.

31. A transgenic non-human mammal according to claim 30, wherein said mammal is a rodent.

32. The method of claim 1, further comprising the step of comparing the measurements obtained after repeating steps (a) and (b) wherein in at least part of the method the protein or part protein in steps (a) and (b) is:

PIM1-kinase;

a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3 or 5 or a polynucleotide which is at least 90% homologous thereto;

a protein with an amino acid sequence comprising SEQ ID NO: 2, 4 or 6, or a protein which is at least 90% homologous thereto;

a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3 or 5 or antisense polynucleotides thereof, or

a part protein of one of the abovementioned proteins which is at least 10 amino acids long,

or in another part of the method the protein or part protein in steps (a) and (b) is:

PIM2-kinase;

PIM3-kinase;

a protein encoded by a polynucleotide comprising SEQ ID NO: 7, 8 or 10 or a polynucleotide at least 90% homologous thereto;

a protein with an amino acid sequence comprising SEQ ID NO: 9 or 11 or a protein which is at least 90% homologous thereto;

a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 7, 8 or 10 or antisense polynucleotides thereof, or

a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

33. The method of claim 32, wherein in at least part of the method the protein or part protein in steps (a) and (b) is:

a protein encoded by a polynucleotide which is at least 95% homologous to SEQ ID NO: 1, 3 or 5;

a protein which is at least 95% homologous to SEQ ID NO: 2, 4 or 6, or

a part protein of one of the abovementioned proteins which is at least 10 amino acids long,

or in another part of the method the protein or part protein in steps (a) and (b) is:

a protein encoded by a polynucleotide which is at least 95% homologous to SEQ ID NO: 7, 8 or 10;

a protein which is at least 95% homologous to SEQ ID NO: 9 or 11, or

a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

34. The method of claim 32, wherein in at least part of the method the protein or part protein in steps (a) and (b) is:

a protein encoded by a polynucleotide which is at least 97% homologous to SEQ ID NO: 1, 3 or 5;

a protein which is at least 97% homologous to SEQ ID NO: 2, 4 or 6, or

a part protein of one of the abovementioned proteins which is at least 10 amino acids long,

or in another part of the method the protein or part protein in steps (a) and (b) is:

a protein encoded by a polynucleotide which is at least 97% homologous to SEQ ID NO: 7, 8 or 10;

a protein which is at least 97% homologous to SEQ ID NO: 9 or 11, or

a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

35. A compound identified as a pain-regulating substance by the steps of:

(a) incubating a test substance with a cell or a preparation from a cell which has synthesized the protein PIM1-kinase or PIM3-kinase or a protein comprising SEQ ID NO: 2, 4, 6, 9 or 11 or a protein which is at least 90% homologous thereto or a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3, 5, 7, 8 or 10 or a protein encoded by a polynucleotide which is at least 90% homologous thereto, or a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3, 5, 7, 8 or 10 or an antisense polynucleotide thereof, or a part protein of one of the abovementioned proteins which is at least 10 amino acids long, and

(b) measuring the binding of the test substance to the protein or part protein synthesized by the cell, or measuring at least one functional

parameter modified by the binding of the test substance to the protein or part protein.

36. A composition comprising as a pharmaceutically or diagnostically active ingredient an effective amount of:

a. a polynucleotide which codes for PIM1-kinase or PIM3-kinase or a polynucleotide which is at least 90% homologous with SEQ ID NO. 1, 3, 5, 7, 8 or 10;

b. a polynucleotide which is capable of binding specifically to one of the polynucleotides listed under point a);

c. a vector containing a polynucleotide according to one of points a) or b);

d. a PIM1-kinase or PIM3-kinase or a protein comprising SEQ ID NO: 2, 4, 6, 9 or 11 or a protein which is at least 90% homologous with one of these abovementioned proteins or a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3, 5, 7, 8 or 10 or a protein encoded by a polynucleotide which is at least 90% homologous thereto, or a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3, 5, 7, 8 or 10 or a protein encoded by antisense polynucleotides thereof or a part protein of one of the abovementioned proteins which is at least 10 amino acids long;

e. an antibody against one of the proteins or part proteins according to point d);

f. a cell containing a polynucleotide according to one of points a) or b), a vector according to point c), a protein or part protein according to point d) or an antibody according to point e);

g. a compound according to claim 35, or

h. an active compound which binds to a protein or part protein according to point d), and

at least one carrier or auxiliary substance.

37. The composition of claim 36, wherein said composition comprises:

a. a polynucleotide which is at least 95% homologous with SEQ ID NO: 1, 3, 5, 7, 8 or 10;

b. a polynucleotide which is capable of binding specifically to one of the polynucleotides listed under point a);

c. a vector containing a polynucleotide according to point a) or b), or

d. a cell containing a polynucleotide according to point a) or b), or a vector according to point c).

38. The composition of claim 36, wherein said composition comprises:

a. a polynucleotide which is at least 97% homologous with SEQ ID NO: 1, 3, 5, 7, 8 or 10;

b. a polynucleotide which is capable of binding specifically to one of the polynucleotides listed under point a);

c. a vector containing a polynucleotide according to point a) or b), or

d. a cell containing a polynucleotide according to point a) or b), or a vector according to point c).

39. The composition of claim 36, wherein said composition comprises an antisense polynucleotide or a peptidic nucleic acid capable of binding specifically to one of the polynucleotides listed under point a).

40. A method of alleviating pain in a mammal, said method comprising administering to said mammal an effective pain alleviating amount of a composition according to claim 36.

41. The method of claim 40, wherein said pain is chronic pain.

42. The method of claim 40, wherein said pain is neuropathic pain or inflammation-induced pain.

43. A method of providing gene therapy to a mammal, said method comprising administering to said mammal a therapeutic amount of:

a. a polynucleotide which codes for PIM1-kinase or PIM3-kinase or a polynucleotide which is at least 90% homologous with SEQ ID NO: 1, 3, 5, 7, 8 or 10;

b. a polynucleotide which is capable of binding specifically to one of the polynucleotides listed under point a);

c. a vector comprising a polynucleotide according to point a) or b), or

f. a cell containing a polynucleotide according to point a) or b), or a vector according to point c).

44. The method of claim 43, wherein said gene therapy is *in vivo* gene therapy.

45. The method of claim 43, wherein said gene therapy is *in vitro* gene therapy.

46. A method of diagnosing a mammal, said method comprising administering to said mammal the active ingredient of claim 36, and measuring a change in a functional parameter caused by said active ingredient.

47. A method for investigating the activity of a test substance comprising the steps of:

incubating a test substance with the active ingredient of claim 36, and

measuring binding of the test substance with the active ingredient, or measuring at least one functional parameter modified by interaction of the test substance with the active ingredient.

48. The composition of claim 36 wherein

the polynucleotide according to point a) is a polynucleotide which is at least 90% homologous with SEQ ID NO: 1, 3 or 5 or

the protein according to point d) is a protein comprising SEQ ID NO: 2, 4 or 6, or a protein which is at least 90% homologous to SEQ ID NO: 2, 4 or 6, or a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3 or 5, or a protein encoded by a polynucleotide which is at least 90% homologous to SEQ ID NO: 1, 3 or 5, or a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3 or 5 or antisense polynucleotides thereof, or a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

49. The method of alleviating pain of claim 40 wherein

the polynucleotide according to point a) is a polynucleotide which is at least 90% homologous with SEQ ID NO: 1, 3 or 5, or

the protein according to point d) is a protein comprising SEQ ID NO: 2, 4 or 6, or a protein which is at least 90% homologous to SEQ ID NO: 2, 4 or 6, or a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3 or 5, or a protein encoded by a polynucleotide which is at least 90% homologous to SEQ ID NO: 1, 3 or 5, or a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3 or 5 or antisense polynucleotides thereof, or a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

50. The method of providing gene therapy of claim 43, wherein

the polynucleotide according to point a) is a polynucleotide which is at least 90% homologous with SEQ ID NO: 1, 3 or 5, or

the protein according to point d) is a protein comprising SEQ ID NO: 2, 4 or 6, or a protein which is at least 90% homologous to SEQ ID NO: 2, 4 or 6, or a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3 or 5, or a protein encoded by a polynucleotide which is at least 90%

homologous to SEQ ID NO: 1, 3 or 5, or a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3 or 5 or antisense polynucleotides thereof, or a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

51. The method of diagnosing a mammal of claim 46, wherein

the polynucleotide according to point a) is a polynucleotide which is at least 90% homologous with SEQ ID NO: 1, 3 or 5, or

the protein according to point d) is a protein comprising SEQ ID NO: 2, 4 or 6, or a protein which is at least 90% homologous to SEQ ID NO: 2, 4 or 6, or a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3 or 5, or a protein encoded by a polynucleotide which is at least 90% homologous to SEQ ID NO: 1, 3 or 5, or a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3 or 5 or antisense polynucleotides thereof, or a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

52. The method of investigating activity according to claim 47, wherein

the polynucleotide according to point a) is a polynucleotide which is at least 90% homologous with SEQ ID NO: 1, 3 or 5, or

the protein according to point d) is a protein comprising SEQ ID NO: 2, 4 or 6, or a protein which is at least 90% homologous to SEQ ID NO: 2, 4 or 6, or a protein encoded by a polynucleotide comprising SEQ ID NO: 1, 3 or 5, or a protein encoded by a polynucleotide which is at least 90% homologous to SEQ ID NO: 1, 3 or 5, or a protein encoded by a nucleic acid which binds under stringent conditions to a polynucleotide comprising SEQ ID NO: 1, 3 or 5 or antisense polynucleotides thereof, or a part protein of one of the abovementioned proteins which is at least 10 amino acids long.

53. The polynucleotide of claim 16, wherein said polynucleotide is selected from the group consisting of RNA, single-stranded DNA and double-stranded DNA.

54. The polynucleotide of claim 53, wherein said polynucleotide is an mRNA or a cDNA.

55. The polynucleotide of claim 19, wherein said polynucleotide is selected from the group consisting of RNA, single-stranded DNA and double-stranded DNA.

56. The polynucleotide of claim 55, wherein said polynucleotide is an mRNA or a cDNA.

57. The polynucleotide of claim 19, wherein said polynucleotide is part of a DNA enzyme or a catalytic RNA or DNA.

58. The polynucleotide of claim 57, wherein said polynucleotide is part of a ribozyme.

59. The composition of claim 36, wherein said active ingredient is a polynucleotide selected from the group consisting of RNA, single-stranded DNA and double-stranded DNA.

60. The composition of claim 59, wherein said polynucleotide is an mRNA or a cDNA.

61. The composition of claim 36 wherein said active ingredient is a polynucleotide which is part of a DNA enzyme or a catalytic RNA or DNA.

62. The composition of claim 61, wherein said polynucleotide is part of a ribozyme.

63. The vector of claim 20, wherein said vector is an expression vector.

64. The vector of claim 20, wherein said vector is derived from a virus or said vector contains at least one LTR, poly A, promoter, or ORI sequence.

65. The composition of claim 36, wherein said vector is an expression vector.

66. The composition of claim 36, wherein said vector is derived from a virus, or said vector contains at least one LTR, poly A, promoter, or ORI sequence.

67. The protein of claim 21, wherein said protein has been post-translationally modified.

68. The protein of claim 67 wherein said protein has been glycosylated, phosphorylated, amidated, methylated, acetylated, ADP-ribosylated, hydroxylated, provided with a membrane anchor, cleaved or shortened.

69. The protein of claim 22, wherein said protein has been post-translationally modified.

70. The protein of claim 69, wherein said protein has been glycosylated, phosphorylated, amidated, methylated, acetylated, ADP-ribosylated, hydroxylated, provided with a membrane anchor, cleaved or shortened.

71. The protein of claim 23, wherein said protein has been post-translationally modified.

72. The protein of claim 71, wherein said protein has been glycosylated, phosphorylated, amidated, methylated, acetylated, ADP-ribosylated, hydroxylated, provided with a membrane anchor, cleaved or shortened.

73. The composition of claim 36, wherein said active ingredient is a protein or part protein which has been post-translationally modified.

74. The composition of claim 73, wherein said protein or part protein has been glycosylated, phosphorylated, amidated, methylated, acetylated, ADP-ribosylated, hydroxylated, provided with a membrane anchor, cleaved or shortened.

75. The antibody of claim 26, wherein said antibody is a monoclonal antibody.

76. The antibody of claim 26, wherein said antibody is a polyclonal antibody.

77. The composition of claim 36, wherein said active ingredient is a monoclonal antibody.

78. The composition of claim 36, wherein said active ingredient is a polyclonal antibody.

79. The cell of claim 27, wherein said cell is an amphibia cell, bacteria cell, yeast cell, insect cell or an immortalized or native mammalian cell.

80. The composition of claim 36 wherein said active ingredient is an amphibia cell, bacteria cell, yeast cell, insect cell or an immortalized or native mammalian cell.

81. The compound of claim 35, wherein said compound is a low molecular weight compound.

82. The composition of claim 36, wherein said active ingredient is a low molecular weight compound.